XAVIER COROMINAS

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@CorominasXavier

Biography

2021-2024 Ph.D. student. PhD Program of Health, Psychology and Psychiatry at *Rovira and Vrigili University*, Psychology department (Tarragona, Spain) and Paris Brain Institute (París, France).

2019-2020 M.Sc. Clinical Neurosciences. *Institute Guttmann*, Autonomous University of Barcelona (Barcelona, Spain).

2015-2019 Bachelor's degree in Physiotherapy. University of Lleida (Lleida, Spain).

Research

Xavier's research interests lie in the development and application of image-optimized non-invasive brain stimulation (NIBS) to casually explore physiological correlates of brain disorders and implement new therapeutic solutions to the clinics. Therefore, up to date, his scientific and technical skills have been developed around three major domains:

- **Brain stimulation technologies**: handling transcranial electrical stimulation (tDCS, tACS and tRNS) expertise, transcranial magnetic stimulation (navigated TMS,) and biophysical optimization for personalized stimulation (ROAST, SimNIBS and TVB).
- **Electrophysiology:** handling electroencephalography (EEG) and electromyography (EMG) expertise and managing software for the neuroimaging data analysis such as Matlab, SPSS, Rstudio, EEGlab, Fieldtrip and Brainstorm.
- **Neuroimage**: handling expertise in structural MRI, fMRI and DTI with knowledge using software for analysis such as MRIcron, FSL, SPM, CAT12, ITK-SNAP, HOROS, CONN, Nilearn.

Principal ongoing project

1. **Development of TUS for the modulation of cerebellar deep nuclei.**
   At the DRCMR, I develop non-invasive transcranial ultrasonic brain stimulation techniques aimed at modulating deep cerebellar activity. This research seeks to causally explore and influence human voluntary movement.
2. **Impact of weak magnetic fields in the human brain**.
   At the Paris Brain Institute, I investigate the oscillatory functional effects of very weak magnetic fields on the human brain for neuromodulation purposes.

Ongoing Collaboration

1. **FORTE**: at the Paris Brain Institute I collaborate to investigate the role and causal implications of the cerebello-talamo-cortical networks for reward-based motor learning.
2. **WONDERMIND**: at the Paris Brain Institute I collaborate to understand the causal role of prefrontal oscillatory systems in mind-wondering and its possible implications in cognitive pathological populations.
1. **Simulation and prototyping of multifocal magnetic stimulation technologies**. At the Paris Brain Institute, I collaborate to develop and prototype multifocal stimulations TMS versatile devices for animal and human applications.
2. **E-field & EEG analyses tools**. In collaboration with Aalto University, we are developing new computational methods to merge e-field biophysical modelling and DTI data to better estimate source eeg reconstructed signals for TMS-EEG studies.
3. **STIM-SD**: at the Hospital Pitié-Salpêtrière (France) we are investigating the potential clinical efficacy of tDCS as a treatment to reverse primary progressive aphasia in a longitudinal pre-clinical trial.
4. **HEMIANOTACS**: at the Hospital Pitié-Salpêtrière (France) we are investigating the anatomical, functional and oscillatory mechanisms underlying post-stroke vision loss and potential applications of tACS as a clinical treatment.
6. **E-BRAIN**: at the hospital Joan XXIII of Tarragona (Spain) we aim to explore the potential role of multifocal network tDCS stimulation for post-stroke motor and cognitive recovery.

Academic background

2021-2023 Ph.D. student.
Paris Brain Institute, Sorbonne University (France) / University Rovira and Virgili (Spain).
PhD Program of Health, Psychology and Psychiatry at *Rovira and Vrigili University*, Psychology department, under the supervision of Maria Teresa Colomina Fosch (MD, PhD) from the URV, and under the supervision of Antoni Valero-Cabré (MD, PhD) from the Institute du Cerveau et la Moelle Epinière. Starting date: 10/01/2021.

2019-2020 M.Sc. Clinical Neurosciences (Translational neurosciences and neurorehabilitation).
Institute Guttmann, Autonomous University of Barcelona, Barcelona, Spain.

2015-2019 Bachelor's degree in Physiotherapy.
University of Lleida (Lleida, Spain).

Complementary training

COBS 2024 (Copenaghen brain stimulation week) – DRCMR, Denmark
Acquired expertise: advanced management of brain stimulation (TMS,tDCS,tACS) experimental procedures and neuroimaging data analyses.

WIRED 2024 (Intracranial recordings and DBS) – ICM, France
Acquired expertise: advanced management of intracranial recordings analyses combined with deep brain stimulation.

2023 FSL course – OXFORD, UK.
Acquired expertise: advanced management of FSL tool for structural MRI, fMRI, DTI, tractography, MRS and ASL data analyses.

2023 9th Science Factory school – Aalto University, Finland.
Acquired expertise: cutting edge methodological implementation of TMS-EEG.

E-Brains Multi-scale Brain Simulations 2022 - workshop
Acquired expertise: introduction to multiscale simulation European platforms.

2022 ICM-Star-Trainings – Sorbonne Université, France.
Acquired expertise: advanced management of Matlab, Python, Rstatistics and Redcap.

2021 EEGlab course
Acquired expertise: advanced analysis of electroencephalography data with eeglab.

2021 Fieldtrip course.
Acquired expertise: advanced analysis of electroencephalography data with fieldtrip.

2021: MATLAB course – Sorbonne Université, France.
Acquired expertise: basic programming skills.

2021 The Virtual Brain course.
Acquired expertise: simulate personalized computer-based brain network models from the micro- to macro- scale.

2020 Open access publication course: CINAHL, SCOPUS, Mendely policies, aids and tools – URV, Spain.
Acquired expertise: general knowledge on open access publishing opportunities.

2020 Peripheric electrophysiology and dry needling in humans – Spain.
Acquired expertise: clinical training on dry needling therapeutic applications.

2020 Management of the neurological child patient– Spain.
Acquired expertise: advanced clinical knowledge and hands-on training for neurologic infant management.

Scientific publications

First author publications:

Title: **"High-density transcranial direct current stimulation to improve upper limb motor function following stroke: study protocol for a double-blind randomized clinical trial targeting prefrontal and/or cerebellar cognitive contributions to voluntary motion".**
Journal: *Trials*, part of Springer Nature.

Corominas-Teruel, X., Bracco, M., Fibla, M., Segundo, R. M. S., Villalobos-Llaó, M., Gallea, C., Beranger, B., Toba, M., Valero-Cabré, A., & Colomina, M. T. (2023). High-density transcranial direct current stimulation to improve upper limb motor function following stroke: study protocol for a double-blind randomized clinical trial targeting prefrontal and/or cerebellar cognitive contributions to voluntary motion. *Trials*, *24*(1), 783. https://doi.org/10.1186/s13063-023-07680-8

Title: **"Transcranial direct current stimulation for gait rehabilitation following stroke: A systematic review of current literature and beyond".**
Journal: *Frontiers in Neurology.*

Corominas-Teruel, X., Mozo, R. M. S. S., Simó, M. F., Colomina Fosch, M. T., & Valero-Cabré, A. (2022). Transcranial direct current stimulation for gait recovery following stroke: A systematic review of current literature and beyond. *Frontiers in Neurology*, *13*. https://www.frontiersin.org/articles/10.3389/fneur.2022.953939

Collaborations & Published Abstracts:

Please see: https://www.researchgate.net/profile/Xavier-Corominas-Teruel

Conferences & Communications

Presenter

2024 OHBM, Korea Seoul
Date: 23-27 June 2024
Repercussion: International
Category: poster communication
Organizer: Organization for Human Brain Mapping
Title of the presentation: “Estimating the Primary Activation in TMS-Evoked EEG recordings through Source-Based Filtering”.

2023 Neuromodulation Seminar
Date: 16/11/2023
Repercussion: National
Category: oral communication
Organizer: Universitat Rovira I Virgili
Title of the presentation: “Causal mapping of brain functions: from experimental to therapeutics”.

2023 11th IBRO 2023 World Congress of Neuroscience
Date: 9-13/9/2023
Repercussion: International
Category: poster communication
Organizer: Aalto University
Title of the presentation: (1) “Multifocal stimulation of cerebello-cortical networks for post-stroke cognitive and motor recovery: preliminary evidence from an ongoing preclinical trial”. (2) “Neural signatures of weak magnetic fields in the human brain”.

2023 BrainSTIM, 7th Annual Brain Stimulation and Imaging Meeting
Date: 2-3/6/2023
Repercussion: International
Category: oral communication
Organizer: Aalto University
Title of the presentation: “Low-intensity TMS: towards personalized multifocal spatiotemporal brain stimulation”.

2023 5th Brain Stimulation Conference
Date: 19-23/2/2023
Repercussion: International
Category: poster communication
Organizer: Elsevier
Title of the presentation: “Exploring the potential impact of very low-intensity TMS on resting state neurophysiological activity: A TMS-EEG entrainment study in humans”.

2022 3rd Transcranial Brain Stimulation in Cognitive Neuroscience

Date: 2-5/12/2022
Repercussion: International
Category: poster communication
Organizer: Trento University
Title of the presentation: “Effects of very low-intensity TMS on resting state neurophysiological activity: A TMS-EEG pilot study on the primary motor cortex“

2022 Fens Forum 2022
Date: 9-13/07/2022
Repercussion: International
Category: poster communication
Organizer: Federation of European Neuroscience Societies
Title of the presentation: “Ongoing clinical, electrophysiological and modelling evidence of high-definition bifocal transcranial direct current stimulation in middle cerebral artery stroke: a study protocol for a randomized pilot trial”.

2022 International neuromodulation Society 15th world congress
Date: 21-26/05/202
Repercussion: International
Category: poster communication
Organizer: International neuromodulation Society (INS)
Title of the presentation: “Ongoing clinical trial assessing the therapeutic potential of high- density prefrontal and cerebellar transcranial direct current stimulation to improve gait in stroke patients”.

2021 Psicoexposomoa Congress (MCIU-PSI2017- 90806-REDT)
Date: 21/05/2021
Repercussion: National
Category: oral communication
Organizer: Spanish Science and Innovation Ministry.
Title of the presentation: “Neuromodulation and multipolar tDCS: frontocerebellar stimulation and neuronal recovery in stroke”.

Attendant

Bridging European Science 4th - Conference
Date: 20-21/10/2023
Repercussion: international
Organizer: European Commission, RaiceX association, FECYT, SIEF, Spanish Ministry of Science and Innovation.

Combining TMS and EEG - Conference
Date: 20/10/2021
Repercussion: international
Organizer: Brain stimulation Journal

Individualized Non-invasive Stimulation - Conference
Date: 06/10/ 2021
Repercussion: international
Organizer: Brain stimulation Journal

360 Virtual Reality Fest Barcelona – Conference
Date: 28/09/ 2020
Repercussion: international
Organizer: Mecal Barcelona

Teaching

Introduction to magnetic stimulation and electroencephalography.
University: Opened to all universities of Paris, France.
Grade: Part of CENIR course (opened to all universities of Paris).
Academic year: 2023-2024

Introduction to Brain Stimulation and neuroimaging.
University: Opened to all universities of Paris, France.
Grade: Part of CENIR course (opened to all universities of Paris).
Academic year: 2022-2023

Non-invasive stimulation for rehabilitation sciences.
University: “Universitat Rovira i Virgili”, Tarragona, Spain.
Grade: Physiotherapy and Psychology.
Academic year: 2021-2022

Completed Supervisions

2024. Master co-supervision
Master-2 thesis: “Exploring the interaction between lesion features and tdcs impact on cognitive-motor recovery of stroke patients”.
Master program: Master’s Degree in Neuroscience, Universitat Autónoma de Barcelona, Barcelona, Spain.
Co-supervised with: Dr. AV-C & Dr. MF
Main author: DSP.

2023. Master co-supervision
Master-1 thesis: “Robust behavioural prediction of transcranial direct-current biophysical modelling in primary progressive aphasia”.
Master program: Cogmaster, Sorbonne Université, Paris, France.
Co-supervised with: Dr. AV-C

Main author: JS.

2022-2023. Master co-supervision
Master-2 thesis: “Optimization of MRI-based current distribution biophysical models for language rehabilitation with transcranial direct current stimulation in primary progressive aphasia patients”.
Master program: Cogmaster, Sorbonne Université, Paris, France.
Co-supervised with: Dr. AV-C
Main author: SZ

2021-2022 Undergrade co-supervision
Grade thesis: “Transcranial electrical stimulation combined with repetitive peripheric percussion reduces spasticity in post-stroke subjects: clinical case”.
Grade program: Physiotherapy grade, Universitat Rovira i Virgili, Tarragona, Spain.
Co-supervised with: Dr. MFS
Main author(s): MVL & JMP.

2021-2022 Undergrad co-supervision
Grade thesis: ”Primary motor cortical excitability manipulation for post-stroke gait recovery”.
Grade program: Physiotherapy grade, Universitat Rovira i Virgili, Tarragona, Spain.
Co-supervised with: Dr. MFS
Main author(s): CG & CF.

2020-2021 Undergrad co-supervision
Grade thesis: “Short-term effects of transcranial direct current stimulation of the DLPFC in attentional states: a pilot study”.
Grade program: Psychology grade, Universitat Rovira i Virgili, Tarragona, Spain.
Co-supervised with: Dr. MTC & Dr. DR.
Main author(s): PM

Research Fellows & Honors

2024 Johannes-Gutenberg University Medical Center Mainz, Til Ole Berggman’s Lab. Langenbeckstr. 1, Bldg. 308c, 55131 Mainz, Germany

2023 Carnot Maturation, Institut Carnot (national, France, competitive 15k)

2023 Carnot Training, Open Brain School (national, France, competitive 7k)

2023 FENS/IBRO-PERC Exchange Fellowship Programme (international, competitive, 4k)

2021 Institute du Cerveau et la Moelle Epinière (ICM, FRONTLAB team, CNRS UMR 7225) located at the Hôpital de la Pitié Salpêtrière in Paris (FRANCE) and affiliated to Sorbonne Université.

2021 Universitat Rovira I Virgili. PhD salary award (national, Spain, competitive)

2020 Institute Guttman, Barcelona, Spain

2018 Universidad mayor de Chile. Travel award (international, competitive,3k).

Clinical expertise

2021-2023 Hospital de la Pitié-Salpêtrière, APHP, Paris Brain Institute, Paris France.
Institution type: public healthcare institution.
Duration: 2 year.
Position: Assistant in clinical trials delivering neuronavigated brain stimulation with transcranial direct electrical stimulation to patients with primary progressive aphasia and transcranial alternating electrical stimulation to patients with occipital stroke lesions with hemianopsia.

2020-2021 Hospital Joan XXIII Tarragona, Spain.
Institution type: public healthcare institution.
Duration: 1 year.
Position: Operator in pre-clinical trials delivering brain stimulation with transcranial direct electrical stimulation to patients with middle cerebral artery stroke lesions with attentional and movement disorders.

2020 Xarxa Santa Tecla, Tarragona Spain.
Institution type: public healthcare institution.
Duration: 1 year.
Position: clinical position performing functions related to the direct clinical care (neurorehabilitation) of patients with different neurological pathologies and internal protocol updating.

2019-2020 Guttman Institute, Spain.
Institution type: public/private healthcare institution.
Duration: 5 months.
Position: clinical position performing functions related to the direct clinical care (neurorehabilitation) of patients with different neurological pathologies, research assistant and internal protocol updating.

2018-2020 Santiago de Chile Mutual Clinical Hospital, Chile.
Institution type: private healthcare institution.

Duration: 4 months.
Position: clinical position performing functions related to the direct clinical care of patients with different traumatological/neurological pathologies.

2017-2018 Arnau de Vilanova Hospital, Spain.
Institution type: public/private healthcare institution.
Duration: 3 months.
Position: clinical position performing functions related to the direct clinical care of patients with different traumatological pathologies.

2017-2018 Santa Maria de Lleida Hospital, Spain.
Institution type: public/private healthcare institution.
Duration: 3 months.
Position: clinical position performing functions related to the direct clinical care of patients with different traumatological pathologies.

Outreach activities

2023 Bureau de Residents Member (Cité Internationale Universitaire de Paris)
Activity: Co-representative of the international university community resident at the “Cité Internationale Universitaire de Paris“ (~7000 residents) with the authorities.

2023 Interglitches – Paris Brain Institute
Activity: Social awareness-raising activities.

2021 EIT Health program participant
Program: Ignite Health, European Institute of Innovation and Technology.
Position: program participant, focused on industrial translation of scientific knowledge.

2019 International Medical aid
Program: “Volunteer Works”, through the Universidad Mayor de Chile.
Position: collaboration in international volunteering, exercising organizational and clinical assistance functions. Helped to organize the delivery of medical aid from different health disciplines, providing direct health care and promoting the creation of local agencies to facilitate the long-term integration of better-resourced health care mechanisms.

Professional Affiliations & Services

European brain and behavioural society (EBBS,FENS)

Cité Universitaire Internationale Paris & Le Club des Chercheurs
Sociedad española de neurociencia (SENC)
Sociedad de españoles investigadores en Francia (SIEF)